Space Weather Forecast

Issued on Tuesday 25 February 2025 at 01:12 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate flares likely. Chance of G1/Minor geomagnetic storm on Day 1 (25 Feb) due to ongoing enhancements. S1/Minor radiation storm expected on Day 1.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate with four Moderate-class flares, the largest from over the western limb at 24/2306 UTC. There are currently nine sunspot regions on the visible disc. The most notable regions remain two regions in the southwest and northwest quadrants. The southernmost, although large, has remained stable, with perhaps some minor grouping of the intermediate spots. The northern region has shown signs of some decay in the intermediate portion of the group, but still exhibits some magnetic complexity. A region in the northeast appears to be another larger spot region, with a cluster of mature spots on its leading portion. The other regions on the disc do not currently appear particularly complex and are generally stable.

A coronal mass ejection (CME) was observed to the southwest in association with a long duration Moderate-flare from over the west limb. To be determined if there is any Earth-directed component, with analysis pending.

Solar Wind / Geomagnetic Activity: Solar winds showed background conditions at first, before fluctuating between slightly elevated and background levels. Wind speeds varied between 320-460 km/s. Interplanetary Magnetic Field was predominantly moderate. The north-south component was mostly positive (northward-directed), varying between weak and moderate. It did have one sustained moderate negative period. Geomagnetic activity was Quiet to Active (Kp1-4).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) rose close to the S1/Minor radiation storm threshold, in response to flaring from the western limb.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate solar activity is forecast, with occasional Moderate-flares considered likely and a slight chance of isolated Strong-flares.

Solar Wind / Geomagnetic Activity: Ongoing enhancement of the solar wind environment is likely as a result of recent transient CME arrivals, as well as some possible influence from a weak high speed stream (HSS). No other CMEs feature in the forecast. Any influence from the weak HSS

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is expected to wane after Day 1 (25 Feb). A stronger HSS is then expected to become geoeffective from Day 4 (28 Feb) and beyond, with wind speeds of 600 km/s possible.

Geomagnetic activity is forecast to be Quiet to Active (Kp2-4) at first, with a chance of G1/Minor storm (Kp5) intervals and a slight chance of G2/Moderate storm (Kp6) intervals on Day 1 (25 Feb), due to the effects of weak CME arrivals and possible connection to CH17/-. Activity then gradually easing back to Quiet to Unsettled (Kp1-3) from Day 2 (26 Feb). From Day 4 (28 Feb) a connection to CH19 looks likely, with an increasing risk of Active intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to be above the S1/Minor radiation storm threshold on Day 1 (25 Feb) in response to flaring from the western limb, this risk then decreasing slightly through the period.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	10	5	20
Strong	G3	No	5	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	70	70	70	70
Very Active	R3-R5 (X Class)	No	10	10	10	10

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	99	70	50	40
Very Active	**≥ S3 ***	No	10	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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